

PXIE CAD Model: Status, Responsibilities and Plan Forward

14-Jan-2014

C. Baffes

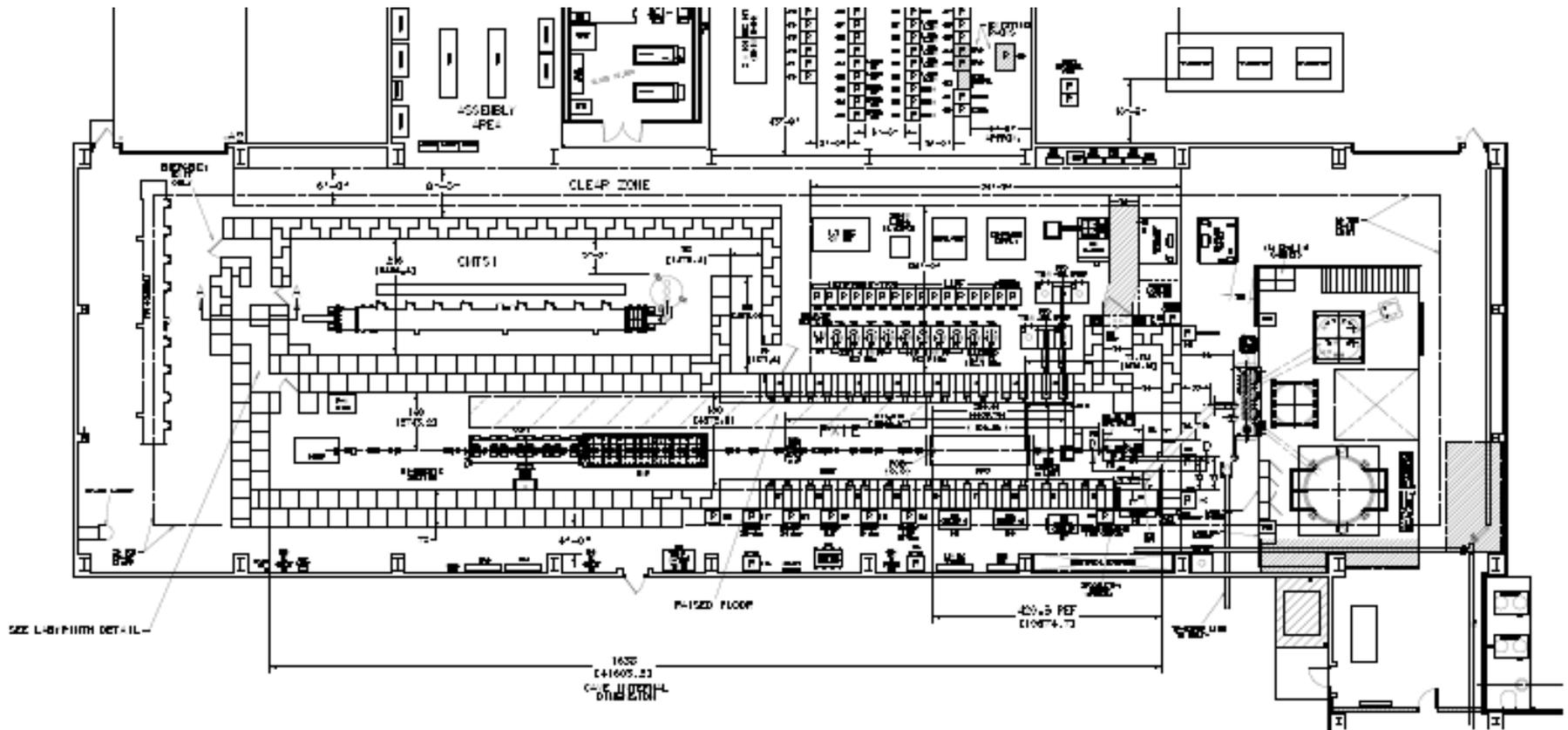
Project X Doc DB: **Project X-doc-1243**

Background: CAD System Transition

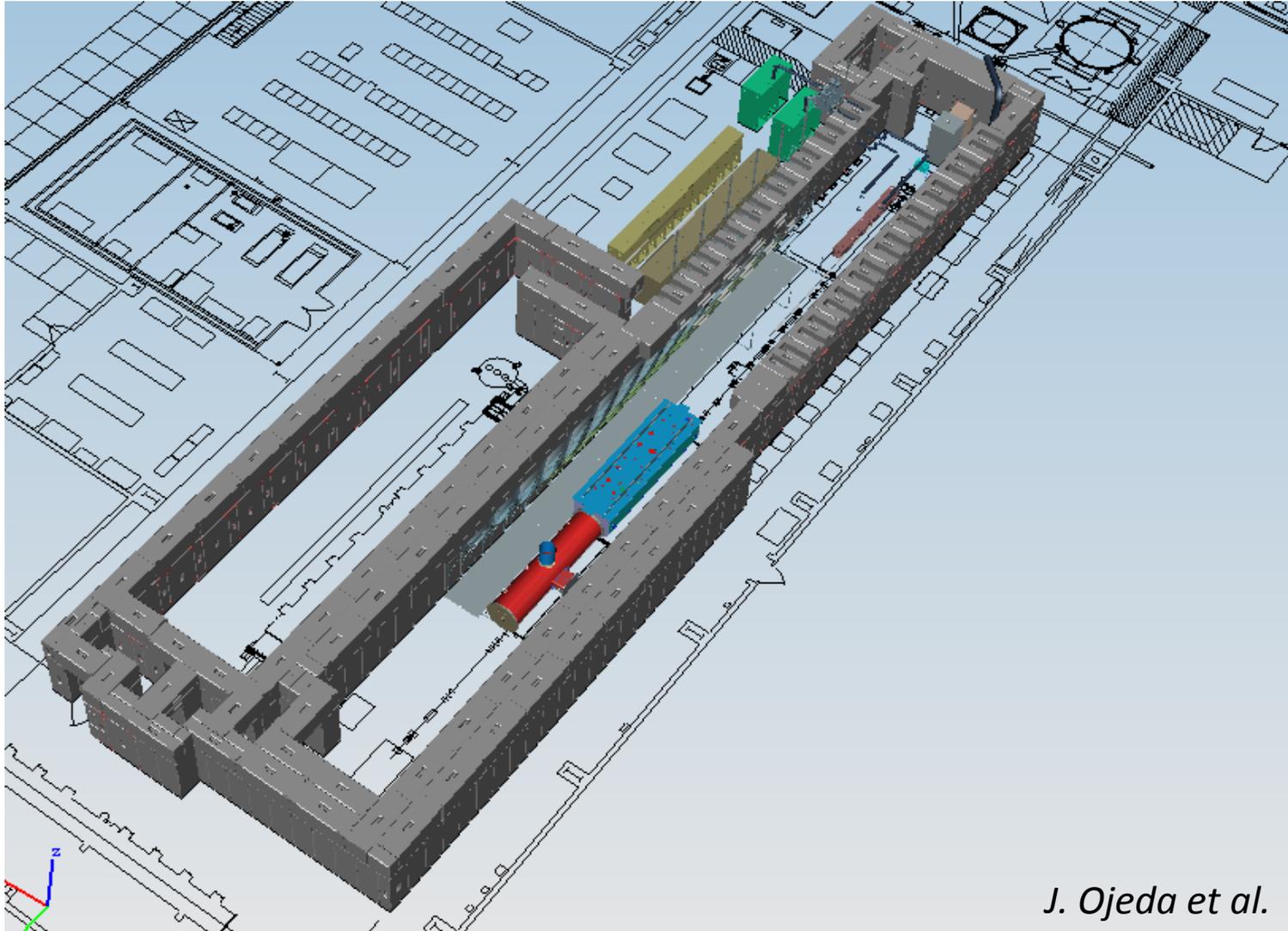


- The lab is transitioning from the IDEAS CAD system to the NX/Teamcenter system
 - NX is the design and drafting program
 - Teamcenter is a data management system, with broader uses beyond CAD
- Transition has been ongoing for quite some time
- The transition must finish soon due to security vulnerabilities associated with running IDEAS on Windows XP
- PXIE data currently exists in both systems

PXIE in IDEAS CMTF layout



PXIE in NX/Teamcenter Work-In-Process 3D Model

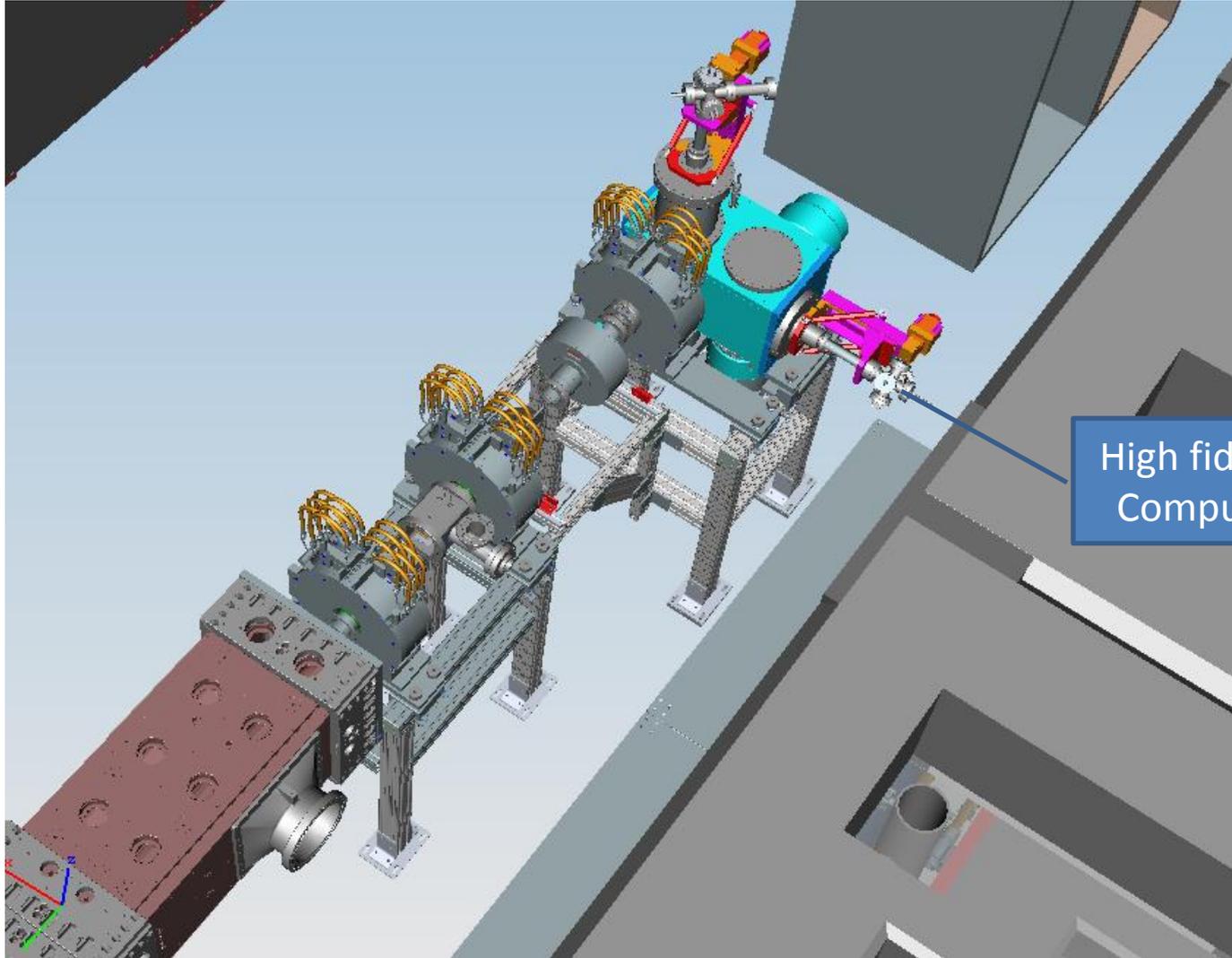


NX CAD Model Issues



- Many subsystems are not yet represented
 - As a consequence, we are vulnerable to interference issues
- Models from other CAD systems will continue to be provided by collaborators
- Mature systems (e.g. the LEBT) are shown in great detail
 - This gives rise to computational issues when loading higher-level assemblies
 - This is a good kind of problem to have...

PXIE in NX/Teamcenter Work-In-Process 3D Model



High fidelity representations:
Computationally expensive

Planned Approach



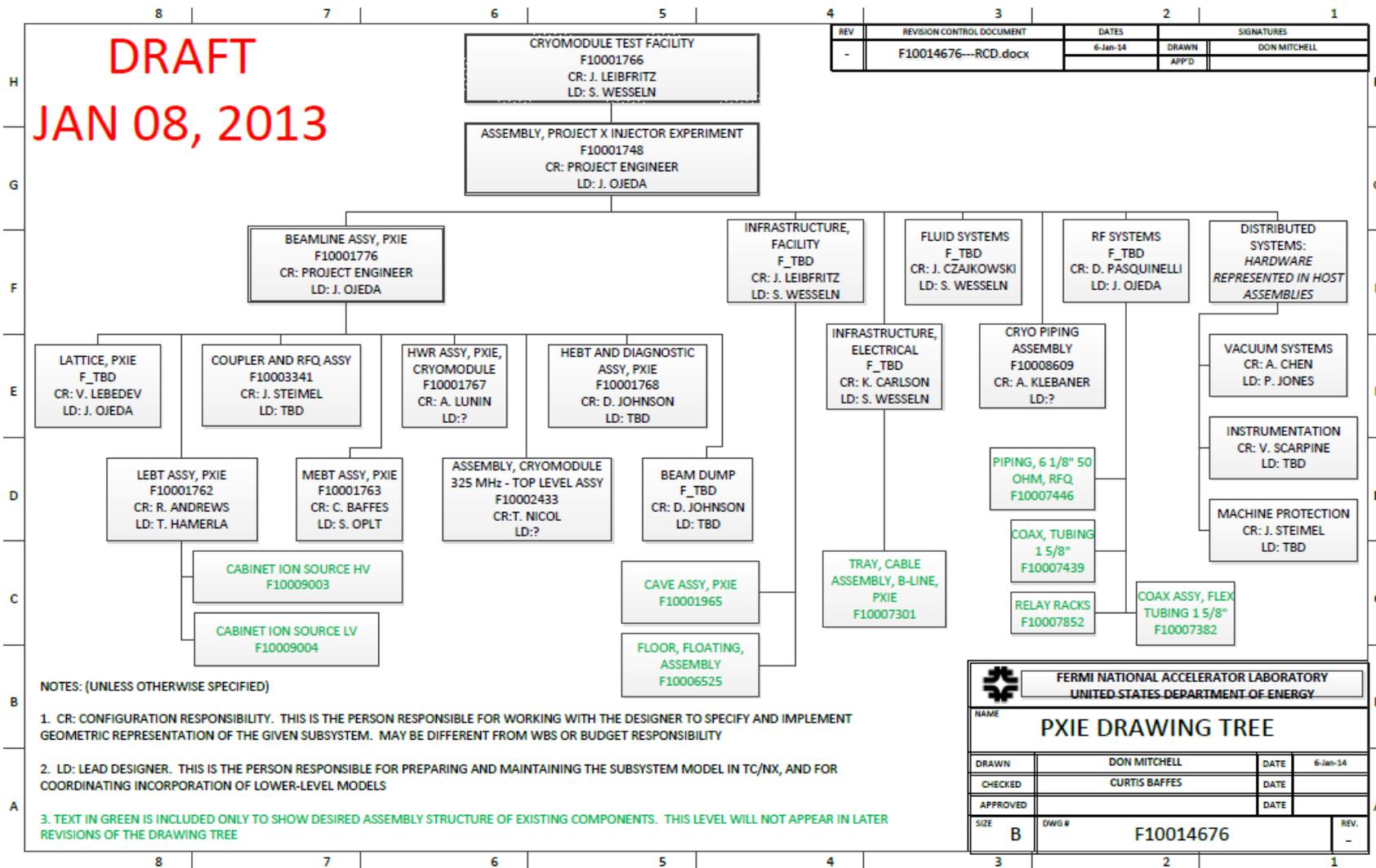
1. Organize structure of top-level NX CAD model to reflect responsibility (create and follow a drawing tree)
2. Use *existing* design resources to create simple representations and envelopes for each PXIE subsystem
3. Work from the more-complete model
 - Update key layout drawings in NX
 - Continue with subsystem design

Planned Approach



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Drawing Tree



NOTES: (UNLESS OTHERWISE SPECIFIED)

1. CR: CONFIGURATION RESPONSIBILITY. THIS IS THE PERSON RESPONSIBLE FOR WORKING WITH THE DESIGNER TO SPECIFY AND IMPLEMENT GEOMETRIC REPRESENTATION OF THE GIVEN SUBSYSTEM. MAY BE DIFFERENT FROM WBS OR BUDGET RESPONSIBILITY
2. LD: LEAD DESIGNER. THIS IS THE PERSON RESPONSIBLE FOR PREPARING AND MAINTAINING THE SUBSYSTEM MODEL IN TC/NX, AND FOR COORDINATING INCORPORATION OF LOWER-LEVEL MODELS
3. TEXT IN GREEN IS INCLUDED ONLY TO SHOW DESIRED ASSEMBLY STRUCTURE OF EXISTING COMPONENTS. THIS LEVEL WILL NOT APPEAR IN LATER REVISIONS OF THE DRAWING TREE

FERMIONATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
NAME PXIE DRAWING TREE			
DRAWN	DON MITCHELL	DATE	6-Jan-14
CHECKED	CURTIS BAFFES	DATE	
APPROVED		DATE	
SIZE	DWG #		REV.
B	F10014676		-

Drawing Tree



- The Drawing Tree:
 - Defines desired top-level assembly structure
 - Identifies current designer responsibility
 - Identifies current “Configuration Responsibility”
- The people identified in the tree are responsible for generating/managing CAD data lower level subsystems
- This file will be circulated for review. Please let me know if:
 - You find errors and omissions
 - You think your subsystem belongs at a different level of the PXIE model

Planned Approach



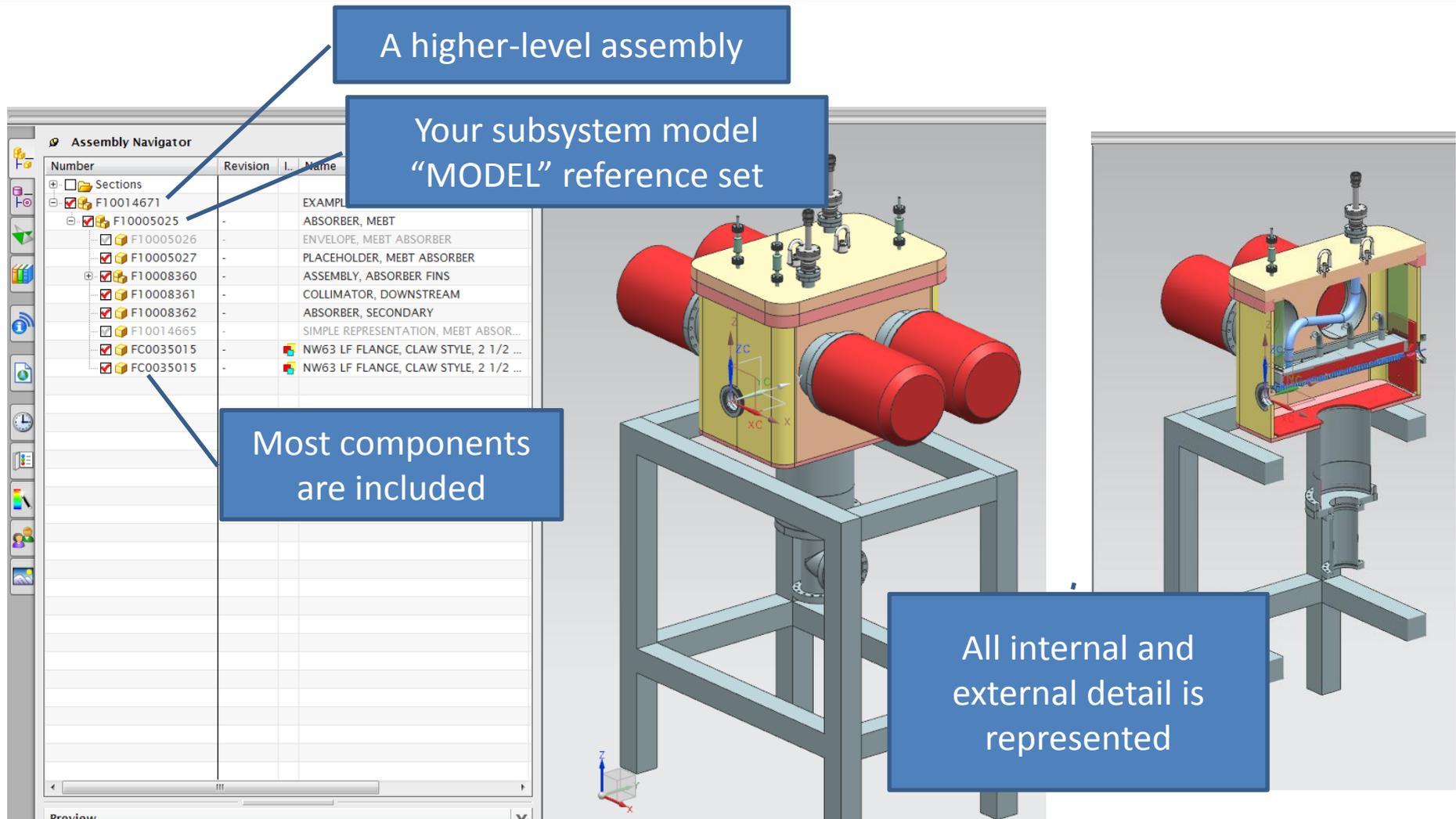
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3D Model Data

We need to develop:

- “MODEL” representations
 - The high-fidelity detailed design
 - Used to create subassembly and part drawings
- “SIMPLE” representations
 - Something that is pictorially the correct size and shape
 - To be used at for efficient viewing of higher levels of assembly
- “ENVELOPE” representations
 - A not-to-exceed volume that a subassembly lives within

MODEL Reference Set Example



A higher-level assembly

Your subsystem model "MODEL" reference set

Most components are included

All internal and external detail is represented

Number	Revision	Name
+		Sections
+		F10014671
+		F10005025
+		F10005026
+		F10005027
+		F10008360
+		F10008361
+		F10008362
+		F10014665
+		FC0035015
+		FC0035015

EXAMPLE
ABSORBER, MEBT
ENVELOPE, MEBT ABSORBER
PLACEHOLDER, MEBT ABSORBER
ASSEMBLY, ABSORBER FINS
COLLIMATOR, DOWNSTREAM
ABSORBER, SECONDARY
SIMPLE REPRESENTATION, MEBT ABSOR...
NW63 LF FLANGE, CLAW STYLE, 2 1/2 ...
NW63 LF FLANGE, CLAW STYLE, 2 1/2 ...

SIMPLE Reference Set Example

A higher-level assembly

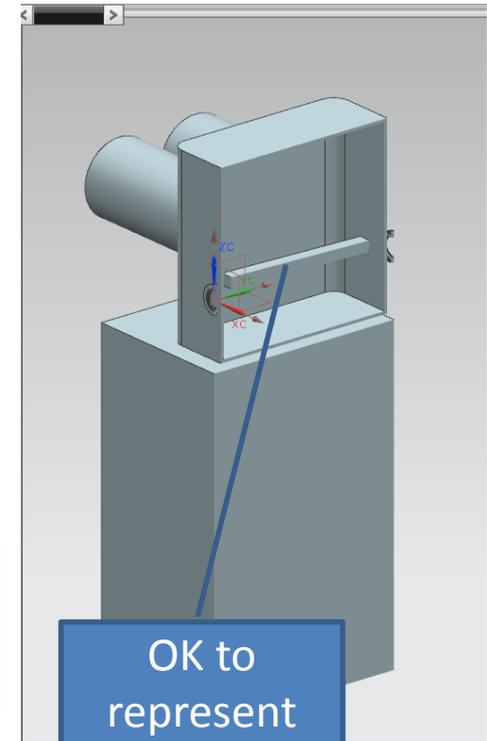
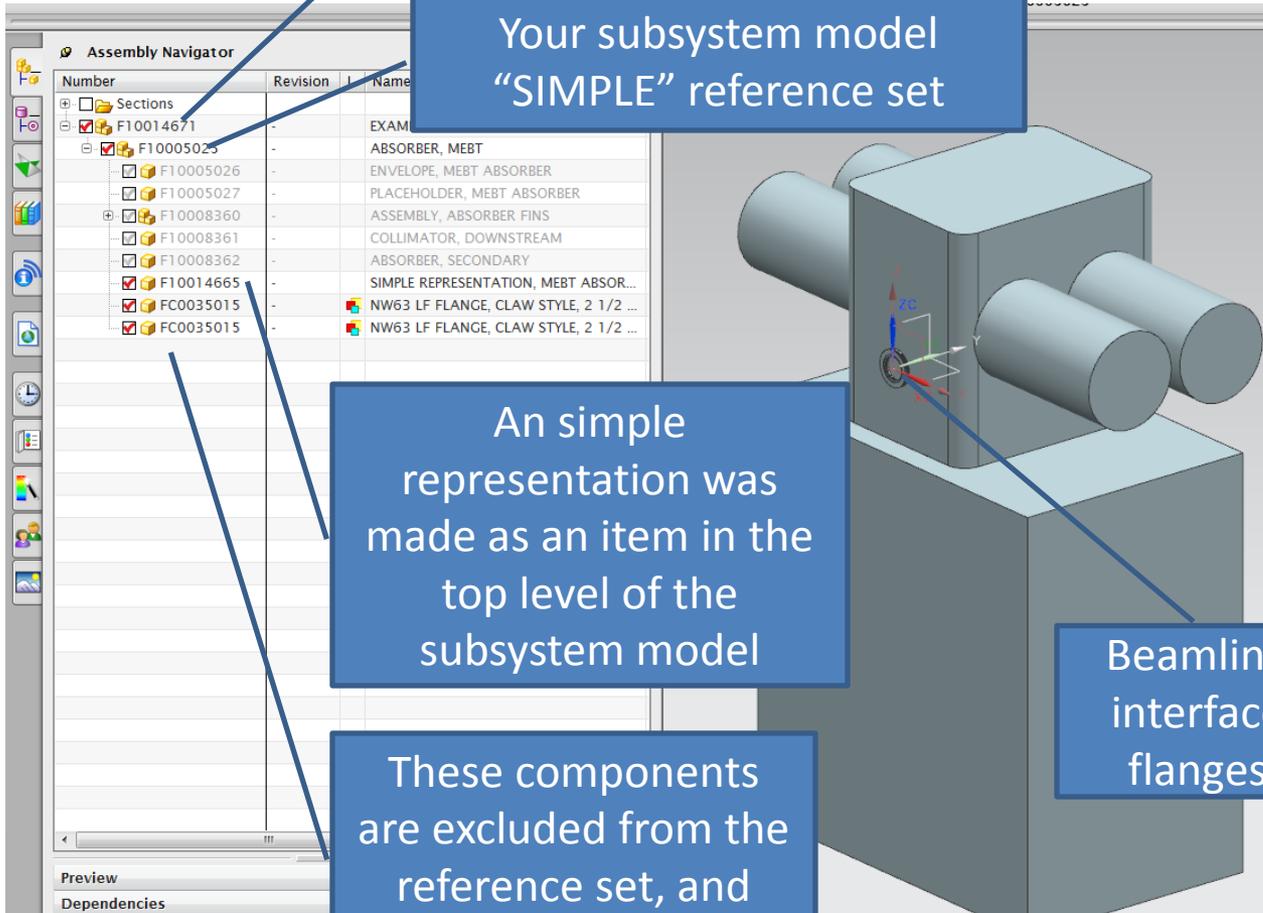
Your subsystem model
"SIMPLE" reference set

An simple representation was made as an item in the top level of the subsystem model

These components are excluded from the reference set, and won't be loaded

Beamline interface flanges

OK to represent key internal details



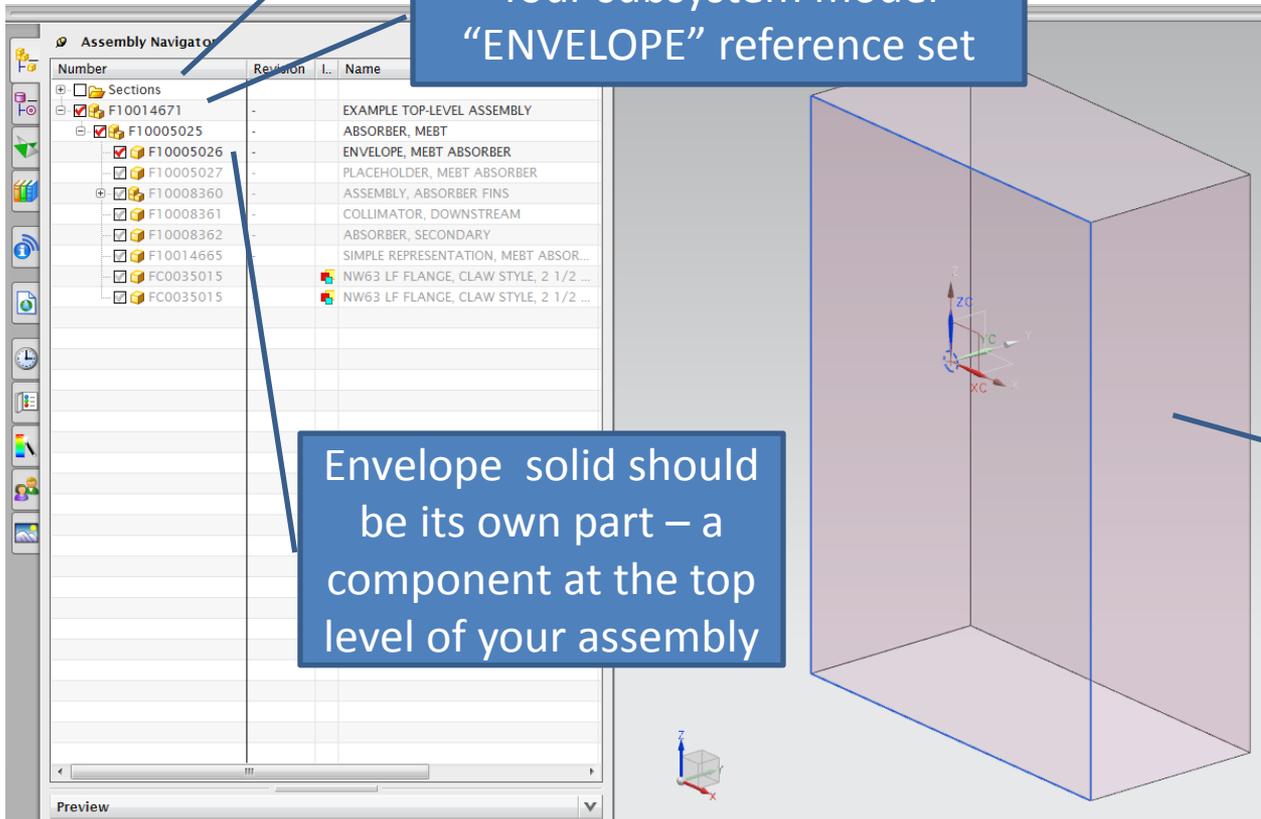
ENVELOPE Reference Set Example

A higher-level assembly

Your subsystem model
“ENVELOPE” reference set

Envelope solid should
be its own part – a
component at the top
level of your assembly

Not-to-
exceed
volume



Data Management



- CAD data will need to be managed using “Reference Sets” and “Arrangements” functions
- A description of the desired modeling practices is being generated by Jeff Ojeda and Don Mitchell
- Once this description is available, a meeting will be called with the relevant stakeholders (folks on the drawing tree) to explain these practices and begin implementation

Near Term Work: Generating SIMPLE Representations

- Designers already working on PXIE will be called upon to generate SIMPLE representations of key components
- Persons with “Configuration Responsibility” will be asked to provide volume definition
 - This could be as simple as a pencil sketch



Final design



What we need now

Planned Approach



1. Organize structure of top-level NX CAD model to reflect responsibility (create and follow a drawing tree)
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Timetable

1. Finalize Drawing Tree, reorganize PXIE CAD model to reflect the same structure – *the next few weeks*
2. Create SIMPLE Representations:
 - Define practices – *by early February*
 - Simple representation of beamline assy – *early March*
 - Simple representations of infrastructure – *~April*
3. Work from the more-complete model
 - Update key layout drawings in NX – *begin late February*
 - Continue with subsystem design - *ongoing*